

BMW Paralever Pivot Maintenance & Upgrade

by Moshe K. Levy



Rubber Chicken Racing Garage's JL Paralever bushing kit is cheap insurance against more costly repairs due to the failure of the OEM Paralever bearings in 1988-2004 BMWs. Honda Moly 60 Paste and Loctite #270 threadlocker are must haves when installing the kit.

AS CLASSIC 1988-2004 Paralever-equipped BMWs continue to age gracefully while performing their duties, owners should think carefully about preventive maintenance before the need for expensive repairs erupts. Arguably the most common failure of the famed Paralever design involves the pivot bearings where the final drive attaches to the rear of the swingarm. The fragile OEM needle roller bearings are a well-known weak spot which can be addressed relatively inexpensively before they fail outright and become a safety hazard.

A proven aftermarket replacement for the OEM bearing is made by JL Enterprises and distributed primarily by Tom Cutter's Rubber Chicken Racing Garage in Yardley, Pennsylvania, where this installation process was recorded on our 2004 BMW R1150RT test mule. For layman's purposes, we will, wherever possible, use commonly available tools in place of the specialized factory tools called for in BMW factory repair manuals. However, one must have Honda Moly 60 lubricant paste and Loctite #270 threadlocker on hand for this job.

We begin by removing the rear wheel, and draining the gear fluid from the final drive. We are then ready to remove the final

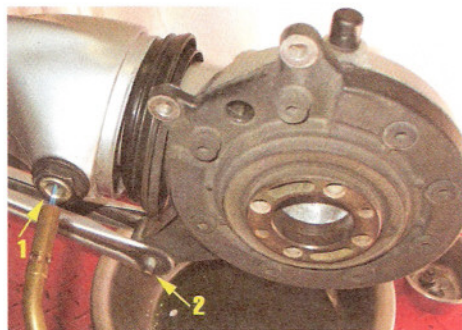
drive assembly itself. With the drive unit supported by the torque arm, heat the adjustable pivot pin on the left side of the final drive with a pinpoint flame from a propane torch to break the high-strength thread locking compound applied at the factory (Figure 1). Note how the flame is aimed directly at the center of the pin's allen keyhole, so as not to damage the surrounding paint on the final drive assembly. Once heated for a few minutes, loosen the pivot pin locknut with a 30mm socket and breaker bar. Then, use a 12mm hex to pull out the adjustable pivot pin itself, as shown in Figure 2. Move to the right side of the final drive, and repeat the prior steps on this non-adjustable pivot pin. Finally, remove the hardware holding the Paralever torque arm to the final drive shown by the arrow in Figure 1.

The final drive will now easily pull off the motorcycle. Place it on a flat surface, taking care not to scratch the paint. The rear universal joint can be removed by using two large flat-blade screwdrivers as shown in Figure 3. Position the screwdrivers as shown and apply slight downward pressure—it does not take much to pop the shaft out, as shown in Figure 4. At last, we're finally able to remove the old OEM Paralever needle bearings. The easiest way to do this is with a homemade puller. You can use a length of allthread

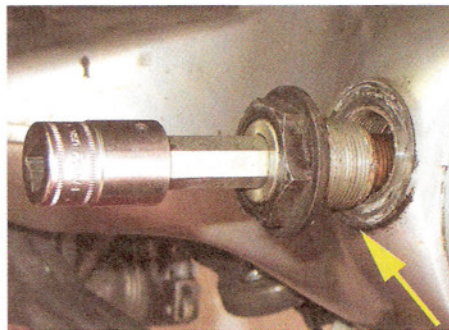
(3/8" works well), a socket which is larger than the diameter of the old needle bearing's race, and some properly sized washers to stabilize things. Figure 5 shows the allthread and a 36mm socket used to draw out the RT's old races.

Sure enough, at nearly 67,000 miles, the original races exhibited deep indents where the OEM needle roller bearings had worn in, as shown in Figure 6. Obviously, this resulted in a very "notchy" action as the needle bearings moved through their range of motion in the races. At best, this was compromising the effectiveness of the rear suspension as the needle bearings fought their way around the scored races. At worst, an outright failure (disintegration) of the bearings could potentially lead to excessive side-to-side final drive assembly play, seriously compromising the stability of the motorcycle under motion.

The replacement JL Paralever Bushing set essentially consists of a pair of solid oil-impregnated, self lubricating 660 Oilite bronze bushings and their matched Timken Bearing races, as shown in Figure 7. Experienced BMW mechanics we spoke to were unanimously at a loss as to why the factory chose needle bearings rather than a bushing design for this application in the



(Fig. 1) Start with the removal of the final drive assembly. Use a torch to break the factory threadlocking compound (arrow 1). The torque arm is also removed (arrow 2).



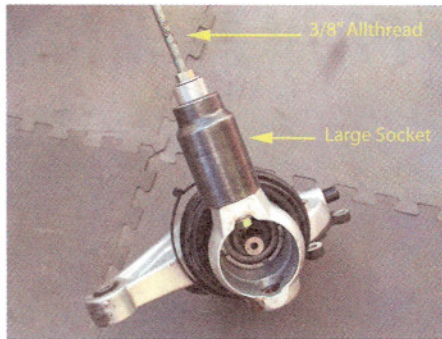
(Fig. 2) After loosening the 30mm locknut, remove the adjustable pivot pin (see arrow). The pin on the other side of the drive must also be removed.



(Fig. 3) Once the final drive is removed, it can be placed on a flat surface and the U-joint can be extracted from the housing with a pair of flat-blade screwdrivers.



(Fig. 4) Removing the housing exposes the offending OEM needle bearings. It is important to do the work on a non-marring surface to protect the paint on the housing.



(Fig. 5) Using a 3/8" Allthread and a 36mm socket placed over the bearing pocket for leverage, the OEM needle bearing and cup can be pulled out.



(Fig. 6) This OEM bearing race displays the ravages of hard use. Left unchecked, the bearings could've seriously affected driveline stability.

first place, given the relatively low velocity and small arc within which the FD rotates on its pivot pins.

To install the new JL kit, we first need to heat the final drive with a heat gun to approximately 250° F, so as to be able to draw the new Timken races into their interference fits using the allthread. Make sure the races are drawn home straight and true, and that the back of the outer race fully seats against the recess in the final drive assembly. With the races in, lubricate the bearing races with the Honda Moly 60 (Molybdenum Disulfide) paste and place the bushings inside to check for fit, as shown in Figure 8. Apply the paste to the driveshaft splines as shown in Figure 9. Be very careful not to get any paste into the ID of the bushings as you handle them—the centers must stay clean and dry.

Driveshaft Phasing

Before reinstalling the final drive assembly, we must remain cognizant of the issue of driveshaft phasing. It is absolutely vital to align the front and rear driveshaft universal joints upon reassembly in order to avoid excessive driveline vibration and wear issues. This is accomplished by ensuring that the top yokes of the front and rear driveshafts are exactly aligned, which is easily done by sight. Once confirmed, mark the shaft halves with a line of White Out or equivalent, as shown in Figure 10. This step will ensure perfect alignment during reinstallation of the final drive.

There are a few more prep steps as we approach final reassembly. First, place the lower universal joint shaft back into the final drive assembly. A firm push by hand will seat it back into place. Next, clean the pivot pins themselves so that their mating surfaces and threads are completely immaculate. The bushings

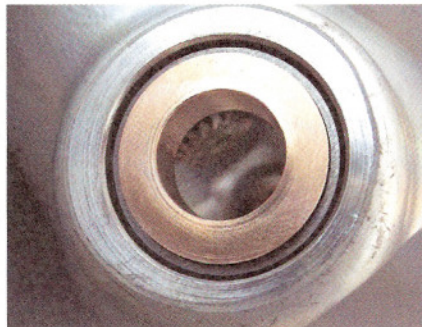
themselves need to be able to sit totally flush against the pivot pin shoulders as shown in Figure 11. Depending on the wear level of the pins on a particular motorcycle, the pins may need some light dress sanding to allow the bushings to seat flush. Some 400 grit wet or dry sandpaper works well here. Flush, snug fitment is critical, so mock up the fitment as shown in the picture prior to installation.

At this point, we are in the final installation stage. Bring the final drive assembly into position for fitment, and loosely attach the Paralever torque arm to it for stability. Align the White Out markings on the driveshaft halves, and lift the final drive assembly up and in until seated. Inserting the driveshaft is made easier with a long screwdriver inserted through the right-side threaded pivot pin hole, to lift the shaft into alignment. Next, fit the right side (non-adjustable) pivot pin in place—this is just to align everything for now, so do not use any threadlocker. Temporarily torque the right side pin to 25–30 lb.-ft.. Take the left side adjustable pivot pin and add the green colored Loctite #270 evenly to the pin shoulder area where the bushing will be fitted, and to the threads as well. (Note: Do not substitute different types of Loctite or other compounds here. Loctite #270 fills and hardens to provide physical support as well as threadlocking capability, and is the only compound approved for this application.) Install the bushing onto the left-side adjustable pivot pin, and then gently tighten it into the final drive assembly.

It is at this point where numerous alternatives are espoused as to final installation and adjustment. The Cutter method described here is preferred since, unlike the set torque numbers (which vary by model) in some written instructions or previous articles on the subject, this method will compensate for each individual



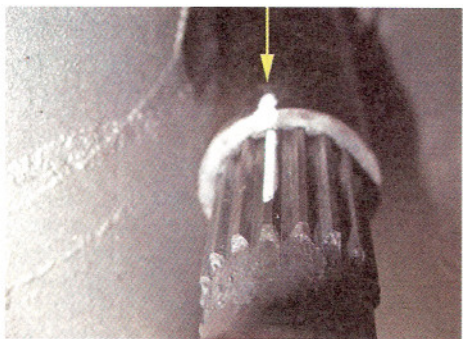
(Fig. 7) Beauty that is beyond skin deep: The JL bushing kit replaces the OEM needle bearings with self-lubricating bronze bushings (left) and high-quality Timken bearing races.



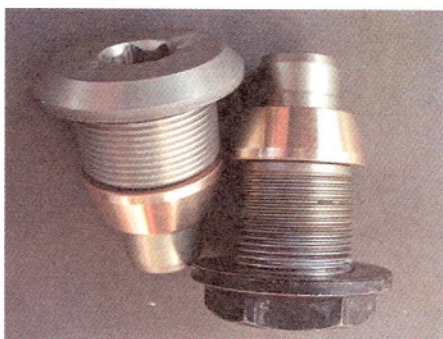
(Fig. 8) The final drive housing must be heated to 250° F and the bearing races fitted straight and true in the recess. The bushings can then be lubed and installed.



(Fig. 9) Apply moly paste to the bearing races (bushing OD) and to the driveshaft splines (shown), but don't apply any to the bushing ID.



(Fig. 10) U-joint alignment (driveshaft phasing) is critical. Align the top yokes of the front and rear shafts by sight and then mark the shaft halves to confirm.



(Fig. 11) Prepare the pivot pins by carefully cleaning the threads and the pivot pin bushings. The bushings must fit flush against the pin shoulders as shown here.



(Fig. 12) Reinstall the final drive, adjust U-joint freeplay with the adjustable pivot pin and tighten both pivot pin locknuts. Then rejoice, the hard part is over!

motorcycle's unique wear and fitment characteristics. The procedure is done purely by feel, as follows: Ensure that the pins are relatively snug and once again remove the hardware which connects the Paralever torque arm to the final drive. Slowly back off the adjustable left side pin until the final drive sags down of its own weight. Now tighten the pin "just enough" so that the final drive can be moved freely up and down in its arc by hand, without sagging of its own weight—perfect. (Find this adjustment point expeditiously, as the Loctite is already drying on the adjustable pivot pin threads!) Mark the left-side adjustable pin position against the FD housing for reference. Install the locknut dry and snug it down, and then wait 30 minutes or so to allow the Loctite on the adjustable pivot pin to set. Now back the locknut off, put the Loctite #270 on the threads of the locknut, and hold the pin in place with the 12mm hex while simultaneously tightening the locknut with an adjustable wrench as shown in Figure 12. Re-check the position of the pivot pin to the final drive housing. Proceed to torque the locknut to 110 lb.-ft., making sure the pin did not move at all during the torquing, and mark the

position of the locknut to the pivot pin for reference as shown in the picture.

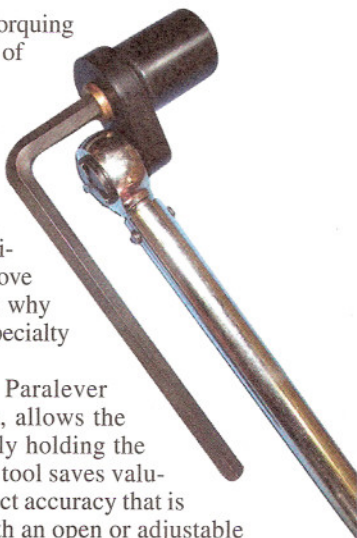
Now remove the right side non-adjustable pivot pin, apply the Loctite #270 to the bushing area and threads as done previously to the left side, reinstall, and torque to 110 lb.-ft. Again, mark the position of the pin to the final drive housing. These markings may be useful 500–1000 miles later when thoroughly reinspect the work, as the first sign of binding of the bushings is movement of the pins from the marked positions. After initial test riding, check the smooth up-down movement of the rear drive as well as any side-to-side play that would indicate a faulty installation. These checks may be made easily by removing the Paralever torque arm bolt and lifting the wheel assembly with the bike on the centerstand. For correct final torque technique of the Paralever torque arm bolt, load the motorcycle (sit on the seat and have a helper assist) while performing the final torquing of the Paralever torque arm bolt to factory specifications.

Riders with severely worn OEM bearings will notice a smoother action in the rear suspension following the installation, though in many cases it takes a sensitive rider to discern the difference. Nonetheless, the addition of the JL Paralever Bushing Kit is an inexpensive way to sidestep a potentially expensive and unsafe failure of the original OEM parts, ensuring that your classic BMW R or K bike will remain on the road for many years to come.

CUTTER PARALEVER ADJUSTABLE PIVOT PIN TORQUE TOOL

One of the trickiest aspects of this procedure is torquing the adjustable pivot pin's locknut to the final spec of 110 lb.-ft. while simultaneously holding the pin itself in place. It can be an exercise in frustration for shadetree mechanics not used to the intricacies of this particular task, because with standard hand tools you can either use a torque wrench on the locknut, or a hex bit on the pivot pin—but not both simultaneously. Slight movements in the pin's position due to locknut movement during torquing can prove frustrating and time-consuming to correct. That's why professionals who perform this task often have specialty tools for the job.

Rubber Chicken Racing Garage's Cutter Paralever Adjustable Pivot Pin Torque Tool, shown here, allows the user to use a torque wrench while simultaneously holding the adjustable pivot pin in a stationary position. The tool saves valuable time and, more importantly, allows for perfect accuracy that is simply not possible by "guessing" the torque with an open or adjustable wrench, or letting the pin move from its ideal setting. It makes the difference between doing the job "well enough" and doing it right. Since BMW owners generally tend to value precision, shop techs or tech day hosts who do not have such a tool should consider one, if Paralever bushing replacement is a common item on the menu of services offered. The tool currently sells for \$175 plus tax and shipping.



RESOURCES

JL Paralever Bushing Kit—\$119
Tom Cutter's Rubber Chicken Racing Garage
1360 Colony Wy., Yardley, PA 19067
Phone: 215-321-7944
Fax: 215-321-7954
www.rubberchickenracinggarage.com

Loctite #270 Threadlocker—\$34.99
Available at local auto parts stores and online
www.loctite.us

Honda Moly 60 Paste—\$9.99
Available at local Honda motorcycle dealers
and online
www.honda.com